

DEMENTIA AND DRIVING: MAXIMIZING THE UTILITY OF IN-OFFICE SCREENING AND ASSESSMENT TOOLS



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Frank J. Molnar, MSc, MDCM,
Canadian Institutes of Health
Research (CIHR) Institute of
Aging–funded CanDRIVE
research team, the Methods
Centre, Ottawa Hospital
Research Institute; Division of
Geriatric Medicine, Department
of Medicine, University of
Ottawa; Regional Geriatric
Program of Eastern Ontario;
Bruyere Research Institute,
Ottawa, Ontario

Mark J. Rapoport, MD, CIHR
Institute of Aging–funded
CanDRIVE research team, the
Methods Centre, Ottawa
Hospital Research Institute;
Department of Psychiatry,
University of Toronto, Toronto,
Ontario; Sunnybrook Health
Sciences Center

Mononita Roy, MD, Division
of Geriatric Medicine,
Department of Medicine,
University of Ottawa, Ottawa,
Ontario

Correspondence may be directed to
fmolnar@ottawahospital.on.ca.

Why Do We Need to Assess Fitness to Drive in Persons with Dementia?

Accurate assessments of fitness to drive allow physicians to help their patients avoid disabling injury or death. Such assessments also help patients and their families avoid the grief and legal repercussions associated with contributing to the injuries or deaths of other road users or bystanders. In many jurisdictions, physicians are legally mandated to report findings, such as moderate dementia, that may indicate a patient is potentially unsafe to drive. When doing so, physicians must remain aware of the risk of social isolation and depression that may ensue after license revocation.

Understanding the Limitations of In-Office Screening and Assessment Tools

The severity and/or instability of medical conditions, high dosages of medications, and/or changing dosages of medications are the primary causes of declines in older-driver competence. Multiple medical conditions and medications may simultaneously affect a given patient. The resulting negative effects at the operational level (i.e., automated actions) can be, to a certain extent, compensated for via behavioural adaptations at the strategic level (e.g., planning when and where to drive, such as restricting driving to optimal traffic and weather conditions) and tactical level (e.g., using defensive driving strategies such as increased following distance). Such adaptations, however, may be less likely to occur when dementia decreases insight.

No screening or assessment tests will ever predict 100% of risk of crashes because in-office tools test only stable intrinsic features (e.g., operational > tactical or strategic skills), miss new or fluctuating illness, and cannot predict extrinsic factors (e.g., weather, other drivers, road conditions, car malfunction, etc.). This does not mean we cannot employ in-office tests to screen for problems that may indicate unfitness to drive, but it does mean that we must be intelligent in the application and cautious in the interpretation of these tests.

Conclusions of Consensus Guidelines Regarding Driving and Dementia

Consensus guidelines generally recommend that those with moderate to severe dementia not drive. The Canadian Medical Association (CMA) *Driver's Guide*, 7th Edition¹ (currently under revision), and the Third Canadian Consensus Conference on Diagnosis and Treatment of Dementia² describe moderate dementia as losing the ability to perform one of the activities of daily living (ADL) or two of the instrumental ADL (IADL) due to cognition.

Many guidelines recommend individualized assessment for those with mild dementia using tests such as the Mini-Mental State Examination (MMSE), clock-drawing test, and the Trail Making Test Part B (Trails B). Unfortunately, these tests are commonly presented without operating instructions vis-à-vis driving (i.e., they lack guidance regarding how to interpret the results of the tests, how to respond to different scores, what cut-off points to use, which errors should result in automatic failure, etc.). More recently, the Montreal Cognitive Assessment Test (MoCA) and the SIMARD (Screen for the Identification of the Cognitively Impaired Medically At-Risk Driver) have also been proposed as screening tests.

The objective of this article is to maximize the ability of physicians to employ existing in-office tools to detect issues that may impact on the fitness to drive of persons with dementia.

Folstein MMSE

The Folstein MMSE has a large body of published evidence describing its sensitivity and specificity in detecting cognitive impairment and dementia. The MMSE does not have any cut-off scores that have been well validated to predict fitness to drive.³ While the MMSE covers a broad range of cognitive domains relevant to driving, a significant limitation is that the MMSE does not have any components that test executive function – a domain that is very pertinent to driving safety. The MMSE is copyrighted, and those employing it are expected to pay a fee for each use.

Clock-Drawing Test

The clock-drawing test assesses visuospatial and executive functions and is easy to perform. Unfortunately, while several different scoring systems exist, these scoring systems are not routinely employed by the majority of practising clinicians. The clock-drawing does not have any cut-off scores that have been well validated to predict fitness to drive.³

Trails B

A study by Tombaugh of the normative values of the Trails B test demonstrated that the mean time to complete Trails B is <180 seconds for all age groups.⁴ There were some outliers whose scores exceeded 180 seconds; the lowest 20th percentile in the 80- to 84-year-old group and the lowest 30th percentile in the 85- to 89-year-old group (the validity of the latter finding being questionable given the small sample size). It is possible that some of these findings do not represent true normative values (i.e., values for persons without diseases or drugs affecting the results) but may represent hidden disease or hidden medication effects. Even if these are true norms for healthy people, being in a normative range may not necessarily mean the patient is safe to drive. We have to accept reality – as people get older, they do not have more time to stop their cars or to respond to emergencies. We must therefore remain very sceptical of age-adjusted norms for tests used to screen for fitness to drive.

A number of Trails B cut-off values have been suggested in the driving literature: 133 seconds,⁵ 147 seconds,⁶ 180 seconds,^{7,8} less than three errors.⁹ Based on this literature, two continuing medical education articles have recommended a cut-off of 180 seconds or three errors.^{10,11} Given the findings of Tombaugh,⁴ indicating the scores of the lowest 20th percentile in the 80- to 84-year-old group and the lowest 30th percentile in the 85- to 89-year-old group exceeded 180 seconds, some experts recommend caution in employing a strict 180-second cut-off. However, given the limitations discussed above of the Tombaugh study, the 180-second cut-off may be correct but more research is required to validate it. Nevertheless, as performance progressively worsens with longer times and/or more errors, clinicians should become increasingly comfortable stating a patient has a functional impairment that may increase the risk of crash (e.g., if a patient took 10 minutes to complete Trails B and made 10 errors, most doctors would likely send this information to their ministry of transportation as a finding that might indicate unfitness to drive). When selecting which cut-offs to employ, physicians must remember that they are not revoking the patient's license to drive. Rather they are providing relevant information to their ministry of transportation to permit the ministry to make the determination. When viewed from this perspective, cut-offs of 180 seconds and/or three errors remain reasonable thresholds to consider when deciding whether or not to bring findings to the attention of the ministry of transportation (provided the test results are a valid reflection of function as discussed below).

Physicians must be aware that different Trail Making Tests exist (e.g., Trails A and B) and that different instructions have been proposed. The cut-off research described above is based on the following approach: first, the sample Trails A must be presented to allow the patient to practise, then Trails A must be performed, then sample Trails

B must be presented to allow the patient to practise, and then Trails B must be performed. Each time the patient makes a mistake, he or she must be corrected. For a sample Trails A and B test, along with instructions, refer to <http://canadiangeriatrics.ca/default/index.cfm/resources/family-physician/>.

Montreal Cognitive Assessment Test

The MoCA (www.mocatest.org) is a more sensitive test than the MMSE (i.e., the MoCA picks up more cases of mild dementia or mild cognitive impairment), but the MoCA is less specific than the MMSE (i.e., the MoCA labels more people with normal cognition as “impaired” than does the MMSE; the MoCA has a higher false-positive rate). The MoCA is copyrighted, but the developer does not charge for use as the owners of the MMSE do.

The MoCA does not have any cut-off points that have been well validated to predict fitness to drive.³

SIMARD

The SIMARD is a relatively new screening tool for fitness to drive (see <http://www.driveable.co.nz/New%20Zealand%20PDFs/SIMARDadministrationinfo.pdf>). The first article describing the properties of the SIMARD was published in 2010.¹² This publication examined the cut-offs of 30 and 70 points on the SIMARD. For those who scored 30 or less; 85.7% failed and 14.3% passed the on-road test (a false-positive rate of 14.3%). For those who scored 31–69; 44.9% failed and 55.1% passed the on-road test. For those who scored 70 or more, 16.1% failed the on-road test (a false-negative rate of 16.1%) and 83.7% passed it. Some concern has been raised regarding the predictive validity of the SIMARD as a screening tool to assess fitness to drive.¹³ The strength of the SIMARD is that it employs “trichotomization” (discussed below). The SIMARD demonstrates promise as a fitness-to-drive screening tool, but it has significant false-positive and false-negative rates, and a significant percentage (49%) of those tested were in the middle range (scoring 31–69), thereby limiting the current utility of the test.¹² These findings indicate that the SIMARD requires further refinement of cut-off scores to improve predictive validity before widespread use can be recommended.

The Future

The CanDRIVE Prospective Cohort Study (www.candrive.ca) will be completing its analysis 1,000 older drivers followed up for 5 years in an attempt to derive better screening and assessment tests for fitness to drive. (F.M. and M.R. are members of the research team.) The study will also examine the optimal cut-off scores for the MMSE, the clock-drawing, MoCA, Trails B, SIMARD, and other tests. Other research groups are also working on potential screening tools and test batteries.

Using Existing Tests Intelligently

No cognitive tests that could potentially be used in an office setting have had cut-off scores validated in persons with dementia.³ But this does not mean the tests cannot be useful.

The MMSE, clock-drawing test, MoCA, Trails B, and SIMARD can provide a rough framework for assessing driving safety. Like any screening tool, they can generate false results if not applied and

interpreted appropriately. The information obtained from them can also be optimized through intelligent application. We recommend employing the following considerations in evaluating the effectiveness and the applicability of a fitness-to-drive screening tool and generated results in specific situations.

Consider Whether the Test Results Are Consistent with Other Clinical Evidence

You should consider test results in the light of other clinical evidence: Are the results of the test consistent with the history provided by the patient, caregiver, and family, and the results of other tests? Conversely, are the results of this single test an outlier, and possibly not reflective of the patient's true functional ability?

Make Certain You Know What You Are Really Measuring

Ensure that you know what you are measuring specifically. Make certain low scores are not due to confounding variables, such as language barrier, low education, dyslexia, performance anxiety, depression, sensory deficits, etc.

Consider Trajectory

Consider whether the patient's function is expected to improve (e.g., delirium, recent head injury, recent stroke etc.), expected to remain stable (e.g., stable head injury, stable stroke etc.) or expected to decline (e.g., dementia, Parkinson's, recurrent delirium etc.).

Understand Your Role

Remember that you do not determine fitness to drive. In jurisdictions with mandatory reporting (see reporting requirements at http://www.cma.ca/multimedia/CMA/Content/Images/Inside_cma/WhatWePublish/Drivers_Guide/Section03_e.pdf), physicians are responsible for forwarding findings that raise concerns regarding fitness to drive to their ministry of transportation; the ministry then interprets these findings to determine fitness to drive.

Use Common Sense: Examine the Severity of Findings

Sometimes it is obvious that a patient is not safe to drive, based on very low valid test scores, very dangerous behaviours, very significant physical limitations, and/or very significant functional impairment. Do not be afraid to make a judgement based on the obvious impairments that may be uncovered.

Examine Qualitative and Dynamic Aspects of the Testing

When interpreting performance on a test, do not focus solely on the score but consider also qualitative dynamic information regarding *how* the test was performed, such as slowness, hesitation, anxiety or panic attacks, impulsive or perseverative behaviour, a lack of focus, multiple corrections, forgetting instructions, inability to understand the test, etc. These findings may be as relevant to fitness to drive as an overall low score on a test.

Understand Cut-Off Scores and Apply Trichotomization

For many health care measures, there is significant overlap between the scores of "normals" and the scores of those who are "impaired" (Figure

Key Points

- Screening for fitness to drive can prevent serious disability and death for patients, their families, other road users, and bystanders.
- No in-office screening tests have well validated cut-off scores for fitness to drive in dementia.
- Despite the above limitations, in-office tests can still be useful in detecting issues that may indicate concerns regarding fitness to drive. This article provides practical guidance regarding how to maximize information obtained from such tests.
- Physicians must remember that they do not determine fitness to drive. In jurisdictions with mandatory reporting, they are responsible for forwarding findings that raise concerns regarding fitness to drive to their ministry of transportation; the ministry must then interpret these findings to determine fitness to drive.

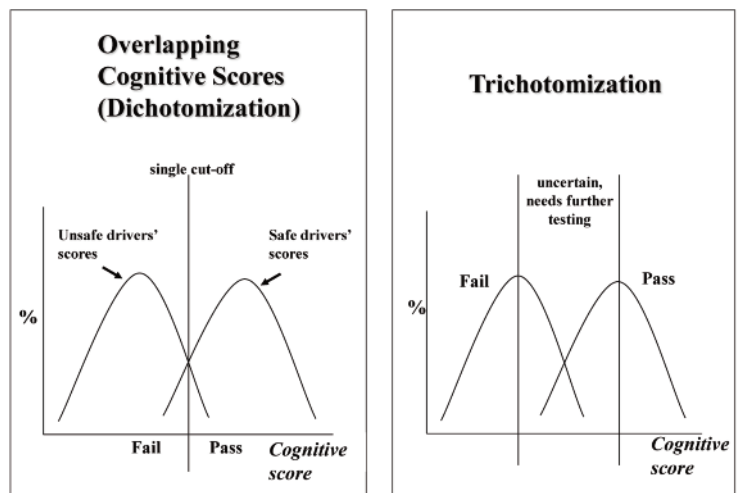


Figure 1. Overlapping cognitive scores of safe and unsafe drivers.

1). This makes reliance on a single cut-off score challenging if not impossible. Ask yourself four questions:

1. Given the results of the cognitive test, would you get in a car with this patient driving?
2. Given the results of the cognitive test, would you let a loved one get in a car with this patient driving?
3. Given the results of the cognitive test, would you want to be crossing a street in front of a car being driven by this patient?
4. Given the results of the cognitive test, would you want to have a loved one cross a street in front of a car being driven by this patient?

These questions will help you “get off the fence.” Three answers are possible (trichotomization): “yes” (no concerns to trigger further testing), “uncertain” (more testing is needed), and “absolutely not” (the risk is clear).

Use Tests in the Context of a More Detailed Approach

Tests do not stand alone but are part of a more detailed assessment. Consider the following resources:

- The November 2010 edition of *Canadian Family Physician*,¹¹ in which Molnar and Simpson describe an approach to sorting through such complex situations in the context of underlying dementia
- *The Driving and Dementia Toolkit for Health Professionals* (<http://www.rgpeo.com/en/health-care-practitioners/resources/driving.aspx>)
- *Alzheimer Knowledge Exchange* (http://www.akeresourcecentre.org/_Index) dementia and driving resources: the Dementia and Driving – Physicians page (<http://www.akeresourcecentre.org/DrivingPhys>) and the Dementia and Driving e-Learning Module (<http://www.akeresourcecentre.org/DrivingModule>)

When the above approaches still do not lead to clear evidence regarding fitness to drive, or when the patient and/or family require greater evidence, referral to a driving assessment program is recommended. To locate such programs, see http://www.cma.ca/multimedia/CMA/Content/Images/Inside_cma/WhatWePublish/Drivers_Guide/AppendixE_e.pdf. If patients with dementia is deemed to be fit to drive, they should be (1) advised that this is temporary and that they need plan for eventual driving cessation (for a patient and caregiver resource, see <http://www.rgpeo.com/media/30422/d%20%20d%20toolkit%20pt%20crgrvr%20eng%20with%20hyperlinks.pdf>); and (2) re-evaluated every 6–12 months.

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